

# REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

## QUESTIONNAIRE

<b>A</b>	<b>Project title:</b> Experimental vertical drainage system in Kuva district of Fergana province
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<b>B</b>	<b>Topic n° : 2</b>	Sub-topic n°: 2
1)	1	Technical field n°: 2
2)	Category n°: 02	

<b>C</b>	<b>Project location</b>		
	Country: Republic of Uzbekistan	Area: 26650 ha	
	Fergana province , Kuva district		

<b>D</b>	<b>Duration of the project:</b>		
	Year in which the project was started: 1981	Project completed: 1985	
		Dates of Expertise: 1985	

<b>E</b>	<b>Organizations and technical staff involved</b>			
1	Supervisor/project coordinator: Mukhamedjanov Shukhrat Organization: SANIIRI  Address: 11, Karasu - 4, Tashkent telephone: 7 (3712) 65 18 52                      fax: E-mail:			%
				Staff resources  100
	Other counterparts:	Organizations	Surname	First name
1				%
2				%
3				%
4				%
	Other collaborators:			man-years

<b>F</b>	<b>Funding agencies</b>	
	Full name or acronym	Percentage of project finance provided
1	Ministry for Land Reclamation and Water Management	100%
2		%
3		%

<b>G</b>	<b>Summary of research project</b>
<p><b>1 Objective and Technical fields:</b>  Identification of quantitative characteristics of ecological-reclamation processes within old irrigated lands under influence of gravel lands irrigation. Development of recommendations on ecological situation improvement.</p>	
<p><b>2 Scientific and technical approaches:</b>  To determine vertical drainage system (VDS) efficiency it is necessary to analyze its operation, irrigation influence on ecological-reclamation situation, groundwater automorphic of half-automorphic regime creation, VDS operation regime under high head of artesian water.</p>	
<p><b>3 Environment characteristics:</b>  Climate is continental.  Average air temperature is 13,8 -14,1 0C, Sum of temperatures within growing season is 4031,4 - 4086,9 0C. Precipitation is 160 -200 mm. relative air humidity is 80 -90% (winter) and 44 -45% (summer). Evaporativity is 1800 -2400 mm.  Relief is middle corrugated, slope is -0,003 -0,01.  Lithology: loam, sandy loam (15 -30), sand (20 -50m). Permeability coefficient of aquifer is 20-40m/day. Artesian water head is 3,0 - 4,0m above land surface. Groundwater gradient is 0,01 - 0,007.</p>	
<p><b>4 Parameters of Pilot Projects and Technical Solutions:</b>  Area of Kuva district is 26650 ha. Land surface altitude is 400 -450m. Crop is cotton (64%)/ Irrigation network earthen and concrete lined. Drainage network-open horizontal drains with specific extend 1,96 m/ha. Drain's depth is 2,5 -3,0m, collector's depth is 4m and more. Number of vertical drains is 230, well's discharge is 20 -60 l/sec, specific yield - 1,0 l/sec.m, screens depth in vertical is 15 -40 m, screen's length is 12 -25 m.</p>	
<p><b>5 Methodology:</b>  Initial information about soil water-salt balance was data of district water department. This data was revised by field measurements of water supply, drainage outflow. Soil profile change was studied by soil sampling.</p>	
<p><b>6 Results:</b>  Because of groundwater raise within 1967 1968 vertical drainage system (VDS) construction was started. Groundwater level was 0,5 -0,8m within growing season and 2,0m within rest of time. Artesian water head was 0,5 - 1,0m higher than groundwater level achieving somewhere 1,5 - 2,0m. Groundwater inflow was 4900 cu.m./ha. To lower groundwater level to 2,2m it was necessary to remove groundwater in amount of 417 mln.cu.m/year. VDS should provide removal of 139 mln.cu.m/year. The rest should be removed by open horizontal drainage, total evaporation and underground outflow.  Since 1968 till 1972 122 wells were put in operation. By 1984 number of wells increased to 230. VDS efficiency was 0,5. Since 1972 till 1982 pumped water volume increased from 13,7 to 19,9 mln.cu.m/year per month (16 -19 mln.cu.m within growing season and 9 mln.cu.m non-growing due to reduction of wells number). Analysis of water-salt balance showed, that main income elements are water supply and groundwater inflow. Water supply was 8,3 - 10,4 th. cu.m/ha (68 87%), groundwater inflow was 4,1-4,9 th.cu.m/ha (39 44%). Water expense mostly depends on total evaporation and drainage outflow. Total evaporation was 8,1 - 8,7 th.cu.m/ha (47-57%) and drainage outflow was from 6259 cu.m/ha (1975) to 9156 cu.m/ha (1981) (178 -306 mln.cu.m). Horizontal drainage share was 115 -157 mln.cu.m, vertical drainage - 63 - 149 mln.cu.m. Salt balance was negative, annual salt removal was 3,5 7,0 t/ha. Main role in salt balance plays irrigation water (5,5 t/ha) and groundwater (5,1 7,1 t/ha ). Salt removal is executed mainly by collector-drainage network</p>	

(14,7-21,5 t/ha). Analysis of soil salinization showed that in 1981 sum of salt was 5 mg. ekv, in 1986 - 0,2 mg. ekv. Groundwater salinity within the period since 1969 till 1984 decreased: salinity to 3 g/l -66% of area and to 5 g/l - 34% (1969); salinity to 3 g/l - 93% and to 5 g/l - only 7% of area.

Pumped water: 0,5 - 1,0 g/l (64% of area) and 1,0 - 3,0 g/l (35%). Salt are mostly sulphate. Upper lands development (increase from 1425 to 11700 ha) was main cause of groundwater level raise. Main crop is cotton irrigated by furrows. Depth of irrigation is 1800 -3000 cu.m/ha, duty was 14000 - 19000 cu.m/ha.

Long-term irrigation led to groundwater inflow increase to 112 mln.cu.m including 97 mln. cu.m due to irrigation of upper lands.

Groundwater extraction regime was developed with due regard to upper land irrigation, which allowed:

- to increase land drainability providing groundwater overflow from cover loam to aquifers (3,5 - 3,7 rh.cu.m./ha);
- to support VDS wells operation with efficiency 0,6 - 0,8;
- to regulate groundwater level 1,5 - 1,9, (May-June) and 2,5 - 3,4 m, (September - October) and artesian water head 0,5 - 0,6 m lower than groundwater level;
- to increase salt removal from 12,2 to 2,01 t/ha.

H	Suggested key-words		
1	Vertical drainage	4	Groundwater dynamics
2	Groundwater level	5	Drainage outflow
3	Duty of water	6	Irrigation

I	Most recent publications (maximum 3)			
1	Author(s): Sh. Mukhamedjanov , M. Yakubov			
	Title: Reclamation state and needed drainability of irrigated lands of Bagdad and Rishtan districts of Fergana province.			
	Publication details: Results of investigations of land reclamation state are given			
	Year of publication: 1994	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/>	confidential <input type="checkbox"/>
2	Author(s):			
	Title:			
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	Title:			
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